CNC-110A Series

C-03/C-13 User's manual

(DOC NO:001212)

1. INTRODUCTION

CNC-110A is a series of COIL WINDING MACHINE CONTROLLER developed by TAILY AUTOMATION. It not only retains all the features of previous designs, it also has a low noise level and is less sensitive to external power fluctuation.

CNC-110A series also features an integrated design: Putting DC motor speed controller, brake and power supplier control circuits into one control box, simultaneously achieving size reduction, high performance and low cost.

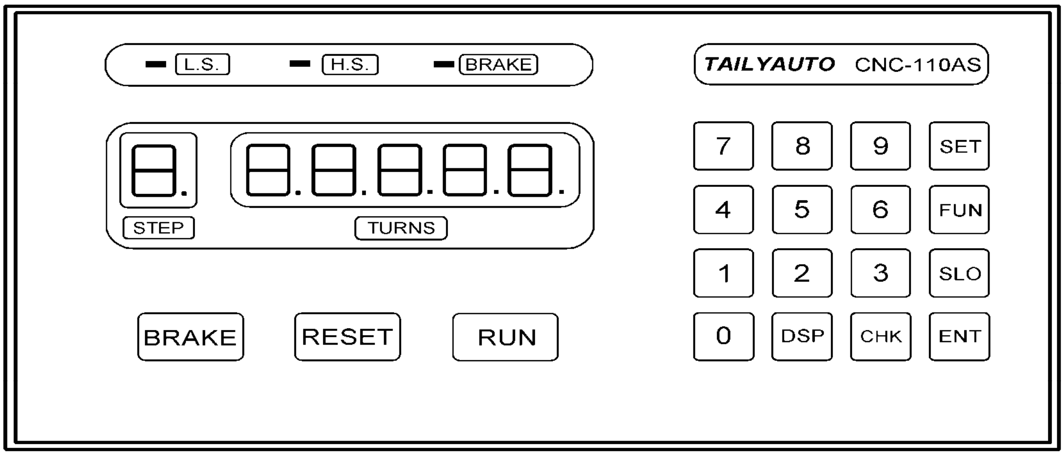
In addition to the CNC-110AS "Standard Model," CNC-110A series also offers CNC-110AE "External connection model" depending on whether a close-loop driver is provided for various applications.

- ◆ **CNC-110AS**：With 0.5HP DC motor driver.
- ◆ **CNC-110AE**：With winding spindle shaft control interface circuit.

2. MAIN FEATURES

- ◆ Microprocessor design, easy for program-setting handling.
- ◆ Three group of memory, ten step in each group.
- ◆ Non-battery design, using EEPROM for saving memory and can retain it for 10 years.
- ◆ Build-in DC motor driver circuit, direct connects to 0.5HP DC motor.
- ◆ The proprietary design of our winding spindle shaft driver, with IR compensation and large torque, is suitable for various DC motors.
- ◆ HI/ LOW winding speed adjusted by potentiometer on back panel.
- ◆ Direct connect DC 24V/12W brake.
- ◆ Choice of versions for AC 110V, 220V and 240V power source at 50/60Hz.

3. FRONT PANEL DESCRIPTION



3.1.Key pads

[0] ~ [9] : 10 key, for entering numerical values.

[SET] : Enter into PARAMETER SETTING mode.

[FUN] : During READY mode , to get into the function select mode.
While setting SLOW STOP TURNS it used to select the winding direction.

[SLO] : While setting TURNS, it used to switching between TOTAL TURNS and SLOW STOP TURNS.

[ENT] : Saving the data to the memory, and finish the setting procedure.

[CHK] : To shows all the winding parameter from first to last STEP.

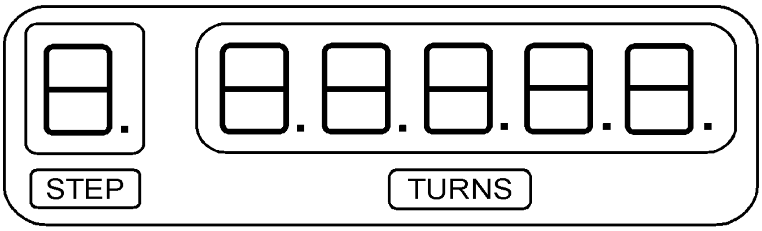
[DSP] : To change the display mode.

[RUN] : To start winding or to pause winding.

[RESET] : At any time, discontinues current operation and return to READY mode.

[BRAKE] : Hold or release the brake.

3.2. Digit display



STEP : Shows the current step number being wound or being set.
When the number is blink its means in READY mode.

TURNS : Shows TURNS, PRODUCTION, or WINDING SPEED(RPM).

☐ **L.S.** : LOW speed winding indicator.

☐ **H.S.** : HI speed winding indicator.

☐ **BRAKE** : Brake status indicator.

4. MEMORY GROUP SELECTION

The controller has three groups of memory. To selection the memory group is as follow. After specifying the group, setting and winding can be done in this group, all un-selected group will retain their original contents and unmodified.

Select first group ： [FUN] [1] [1] [ENT].
Select second group ： [FUN] [1] [2] [ENT].
Select third group ： [FUN] [1] [3] [ENT].

5. WINDING PARAMETERS SETTING

In READY mode, press the following keys combination, to set the winding parameters:

[SET] [0~9] [0~99999] [SLO] [0~799] [FUN] [ENT].

Description：

[SET]	：Enter into PARAMETER SETTING mode**.**
[0~9]	：Select STEP number. [Setting range 0~nine, 10 steps].
[0~99999]	：Total number of turns to be wound. [Setting range 0~99999 turns or 0.0~9999.9 turns].
[SLO]	：Setting SLOW STOP TURNS.
[0~799]	：Number of SLOW STOP TURNS. [Setting range 0~79.9 turns].
[FUN]	：Select winding direction.
[ENT]	：Saving the data to the memory, and finish the setting procedure.

For example: (The counting unit for this example are 0.1).

When you want setting two winding STEPS, 100.5 turns including 5 slow stop turns in clockwise as first STEP, and 150 turns without slow stop turns in counter-clockwise as second STEP, the setting sequence is as follow:

[SET] [1] [1] [0] [0] [5] [SLO] [5] [0] [ENT],

[SET] [2] [1] [5] [0] [0] [SLO] [0] [FUN] [ENT],

[SET] [3] [0] [ENT].

You can have ten STEP marked from **0** to **9** for each group, **1** as the first STEP, 0 as the final STEP. If you not use all ten STEPS, the one that has 0.0 turns will be the END STEP.

5.1. Checked winding parameters

While in READY mode, press [CHK] key, the display will automatically shows all the winding parameter from FIRST STEP to END STEP.

6. CONFIGURATION SETTING

CNC-110AS is a multi-purpose design, to meet various requirements; additional settings are configured to provide flexibility for additional applications.

In the READY mode, pressing the following keys combination as **(6.1. ~6.9.)** all the parameters can be changed.

6.1. Zero point

Select the winding spindle shaft is need or not having a zero point.

With zero point : FUN 2 0 ENT. (Use with zeroing disc. See section 10.1.)

Without zero point : FUN 2 1 ENT.

6.2. Braking mode

The SINGLE MODE is to brake until the end of each winding step**.**

The DOUBLE MODE is to brake a short period when the turns number match the SLOW STOP TURNS, then winding to the end by LOW speed, and brake another time to finish the step**.**

Single mode : FUN 3 0 ENT. Double mode : FUN 3 1 ENT.

6.3. Counting mode

The RELATIVE MODE is to reset the TURNS COUNTER to zero without any consideration before start winding.

The ABSOLUTE MODE is to reset the integer portion of TURNS COUNTER to zero, but keep the decimal portion unchanged.

Relative mode : FUN 4 0 ENT. Absolute mode : FUN 4 1 ENT.

6.4. Starting mode

ON-OFF mode means when press the foot switch, the motor start winding, and when you release the foot switch, the motor stop winding immediately.

TRIGGER mode means when press the foot switch, the motor start winding, and if you want to pause the motor, you have to release the foot switch then press it again.

The RUN key on the front panel always as the Double start mode.

Single start mode : FUN 5 0 ENT. Double start mode : FUN 5 1 ENT.

6.5. Counting unit

You can choose 0.1 or 1 turns as your count unit. After you choose the unit, the TURNS COUNTER, and the winding parameters setting will use it as their basic unit.

Unit = 1 : FUN 6 0 ENT. Unit = 0.1 : FUN 6 1 ENT.

6.6. Brake holding times

In READY mode, press FUN 7 0.1~9.9 ENT keys, to set the holding times for brake.

[Setting range 0.1~9.9 sec], if you set the braking time as 0.0sec, the controller will used the default time 0.3sec.

6.7. Slow start turns

Some of coil winding require slow speed start up in the first couple turns, and then become high speed winding.

In READY mode, press [FUN] [8] [0.1~9.9] [ENT] keys, to set the SLOW STOP TURNS. [Setting range 0.1~9.9 turns].

If you do not need this function, set it in 0.0 to start winding in high speed.

6.8. Brake status

Select brake status during motor stop.

Brake off : [FUN] [9] [0] [ENT]. Brake on : [FUN] [9] [1] [ENT].

6.9. Clear all memory

In READY mode, press [FUN] [0] [0] [0] [ENT] keys, it will clear all the winding parameter to zero, and reset all the configurations, then replace by default data.

Be cautious in using this function or all the parameter will be lost.

7. WINDING EXECUTION

While press the [RUN] key or press the foot switch, the controller will follow the winding parameters and the functions select, to operate the winding process. And if you want to pause the winding process, you can press the [RUN] again, or release the foot switch (Single Start Mode), or press the foot switch again (Double Start Mode).

Then you can continue the winding by process [RUN] or foot switch again.

Or press [RESET] to give up winding.

- ◆ The winding speed can adjust by **H.S.** and **L.S.** potentiometers on back panel.
- ◆ External control signal **RUN/STOP**, used to start or to pause the winding process.
- ◆ External control signal **RES/REV** at **[C-03]** edition represents **RESET**. In any time contact it with **COM**, the controller will reset and get into READY mode.
- ◆ External control signal **RES/REV** at **[C-13]** edition represents **REVERSE**. During PAUSE mode, contact it with **COM**, then restart winding process, the winding spindle will run by opposite direction in LOW speed, and the TURNS COUNTER counting down.

7.1. Change the display mode

The **TURNS** display can be show the TURNS number, PRODUCTION, and winding SPEED, when you turn on the controller, the display shows TURNS number, you can press [DSP] key to change the display shows each data in cycle. When display shows PRODUCTION, or SPEED, press [ENT] key it will go back to show the TURNS.

In difference display mode, the following functions are also available：

◆ **TURNS mode：** During READY or during PAUSE, the following keys can be used.

[0] ：Reset the turns counter.

[1] ：Give up winding process and go to the next STEP.

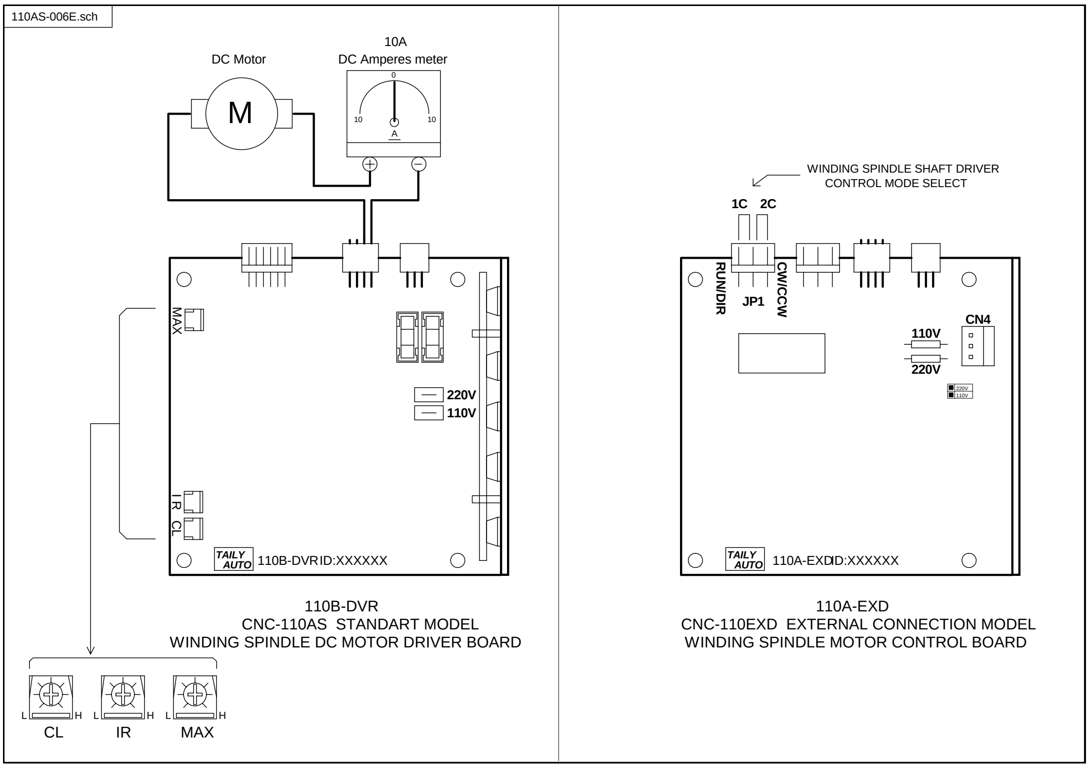
[2] ：Give up winding process and go to the previous STEP.

◆ **PRODUCTION mode：** During READY or during PAUSE, the following keys can be used.

[0] ：Reset production counter.(Hold down for 3 second).

[1] ：To decrease production counter by one.

8. ADJUSTMENT



8.1. Standard model (CNC-110AS)

◆ **CL**：Maximum output current limit.

1. Locking the winding spindle shaft, to make it cannot move; connect a DC Amperes meter between terminal and DC motor. (See Figure-1).
2. Rotate CL to the left end [L], and rotate MAX to the right end [H].
3. Rotate H.S. and L.S. potentiometer on back panel, to the right end [H].
   Then press RUN key to start winding in high speed.
4. Rotate CL in clockwise to set limited current, show on Amperes meter.
   (Limited current = 2A when using DC 180 volt motor).
   (Limited current = 4A when using DC 90 volt motor).
   Then press RUN key to stop winding. Release the winding spindle shaft.

＊The CL have been set by factory before delivery. Only adjust it when change DC motor or replace 210-DVR driver board.＊

◆ **IR**：Torque compensation.

1. Rotate H.S. potentiometer on back panel, to the left end [L], and press DSP key to change the TURNS DISPLAY shows winding speed (RPM).
   Then press RUN key to start winding in low speed.
2. Rotate IR to make the winding in same speed (RPM) during the winding spindle shaft in full-load and unload.
   Then press RUN key to stop winding.

◆ **MAX**：Maximum winding speed.

1. Rotate H.S. and L.S. potentiometer on back panel, to the right end [H].
   Then press [RUN] key to start winding in high speed, and press [DSP] key to change the TURNS DISPLAY shows winding speed (RPM).
2. Rotate MAX to make the winding speed (RPM) as you want.
   Then press [RUN] key to stop winding.

8.2. External Connection Model (CNC-110AE)

◆ **Winding spindle control mode selection**.

Select by JP1 (see Figure-1 or Figure-3).

There are two control mode can be select.

1. **1C**：The **CN5-pin2** represent winding**(RUN)** output. The **CN5-pin3** represents winding direction **(DIR)** output.
2. **2C**：The **CN5-pin2** represent clockwise**(CW)** output. The **CN5-pin3** represents counter-clockwise **(CCW)** output.

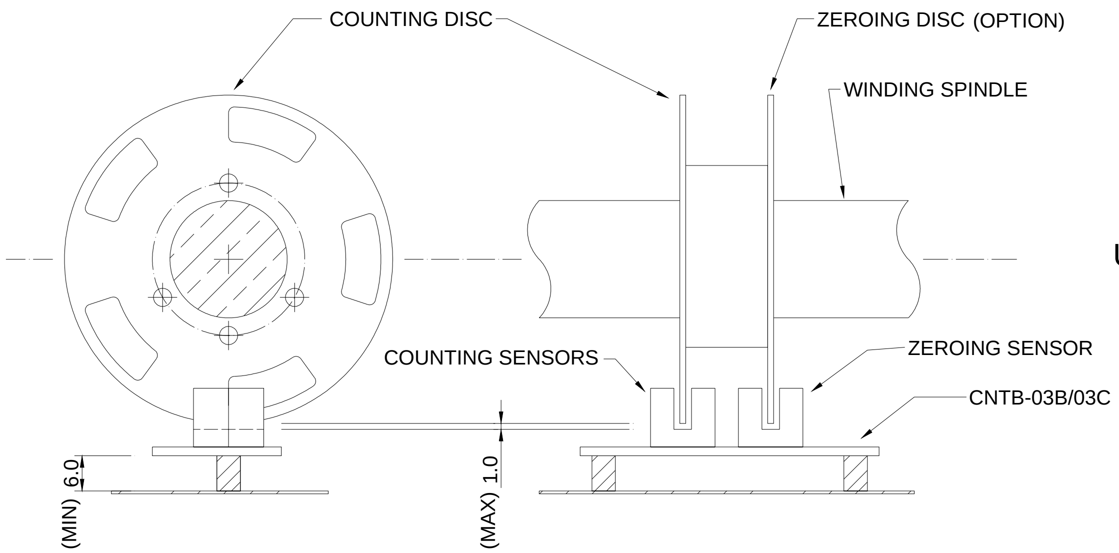
9. FUNCTION TABLE

Set –up winding parameters：--------- [SET] [0~9] [0~99999] [SLO] [0~799] [FUN] [ENT].
Select first memory group：------------ [FUN] [1] [1] [ENT].
Select second memory group：------- [FUN] [1] [2] [ENT].
Select third memory group：----------- [FUN] [1] [3] [ENT].
With zero point：------------------------- [FUN] [2] [0] [ENT].
Without zero point：--------------------- [FUN] [2] [1] [ENT].
Single brake mode：-------------------- [FUN] [3] [0] [ENT].
Double brake mode：------------------- [FUN] [3] [1] [ENT].
Relative counting mode：-------------- [FUN] [4] [0] [ENT].
Absolute counting mode：------------- [FUN] [4] [1] [ENT].
ON-OFF mode：------------------------- [FUN] [5] [0] [ENT].
TRIGGER mode：----------------------- [FUN] [5] [1] [ENT].
Counting unit = 1：---------------------- [FUN] [6] [0] [ENT].
Counting unit = 0.1：-------------------- [FUN] [6] [1] [ENT].
Set-up braking action time：----------- [FUN] [7] [0.1~9.9] [ENT].
Set-up slow start turns：--------------- [FUN] [8] [0.1~9.9] [ENT].
Brake off：--------------------------------- [FUN] [9] [0] [ENT].
Brake on：--------------------------------- [FUN] [9] [1] [ENT].
Clear all memory：---------------------- [FUN] [0] [0] [0] [ENT].

10. INSTALLATION AND WIRING

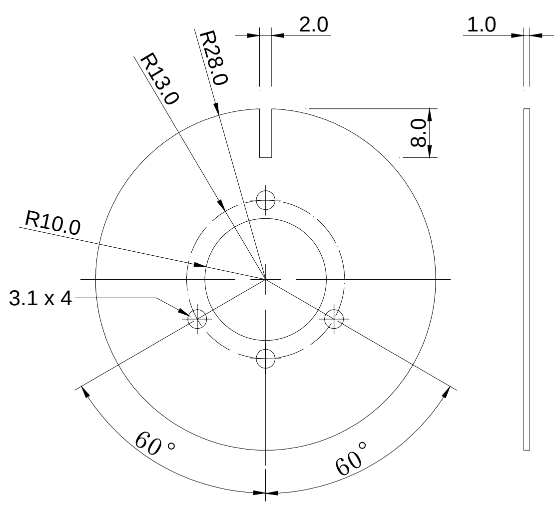
10.1.Counting system assembly

◆ The counting disc and the turns counter **CNTB-03B/03C** must be assembly as below.



Unit=mm

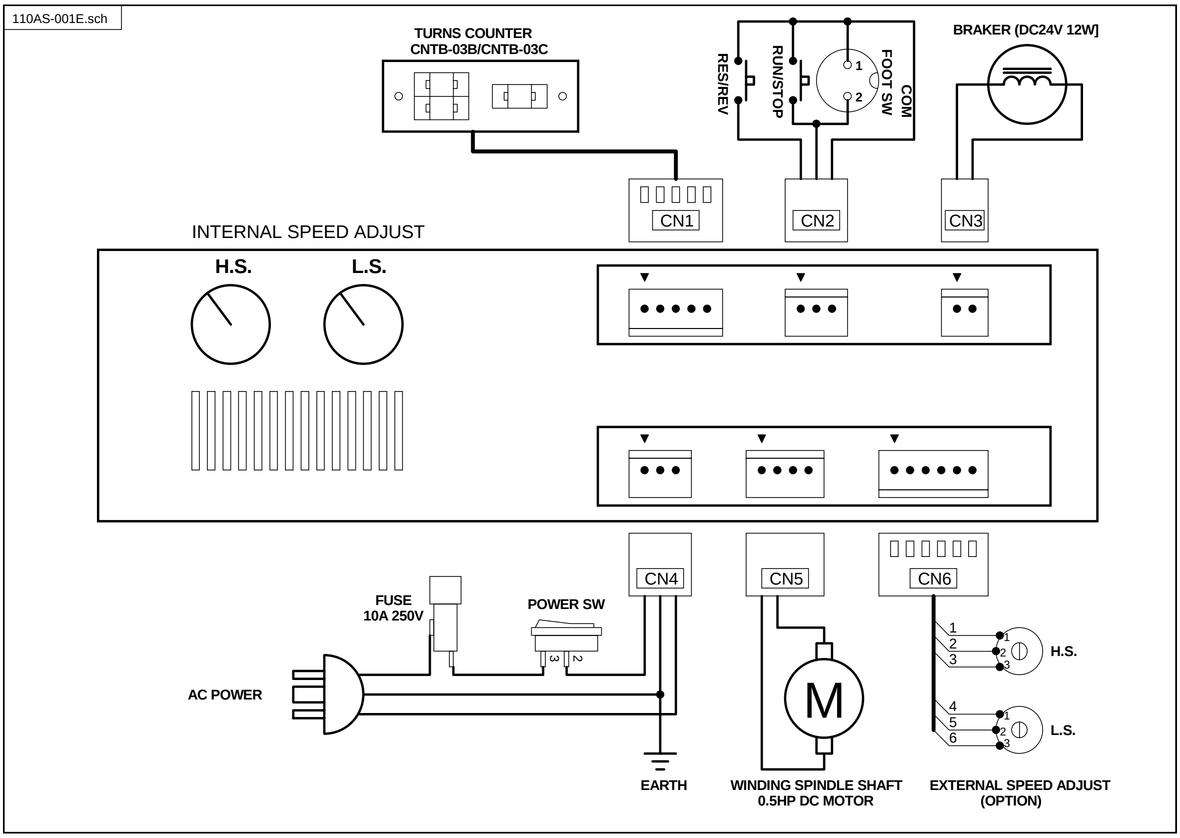
◆ The zeroing disc is not served with the controller. If you need a zero point for the winding spindle, you have to make a zeroing disc as below, and assemble it with counting disc as above.



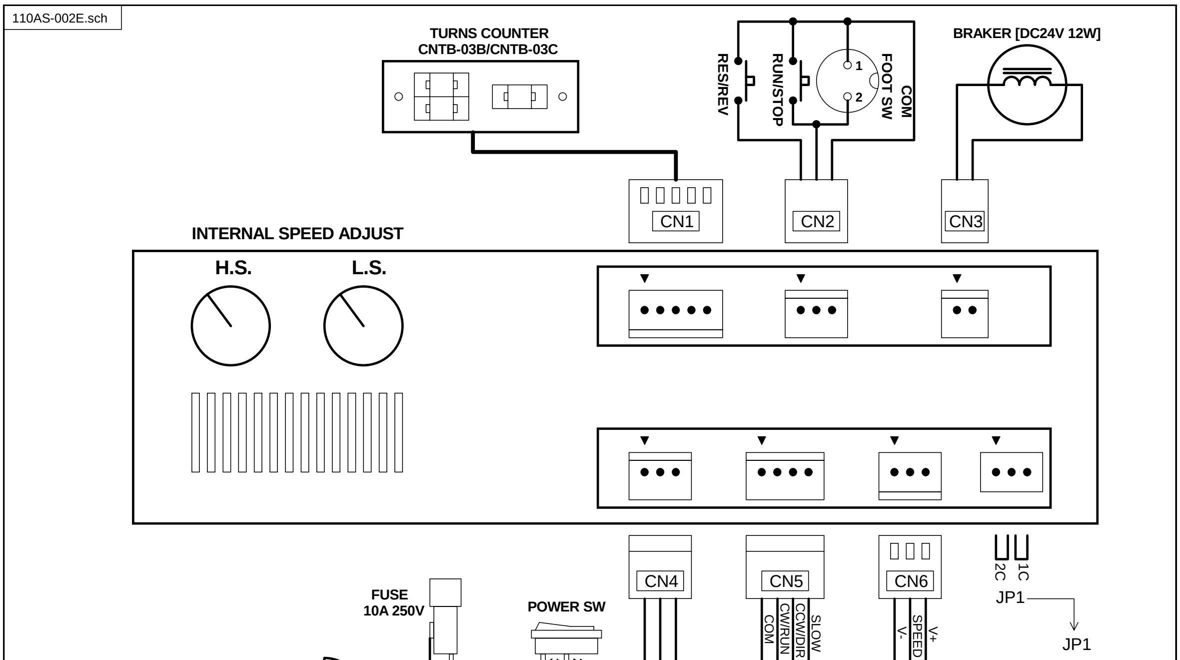
ZEROING DISC

Unit=mm

10.2.External wiring diagram for CNC-110AS

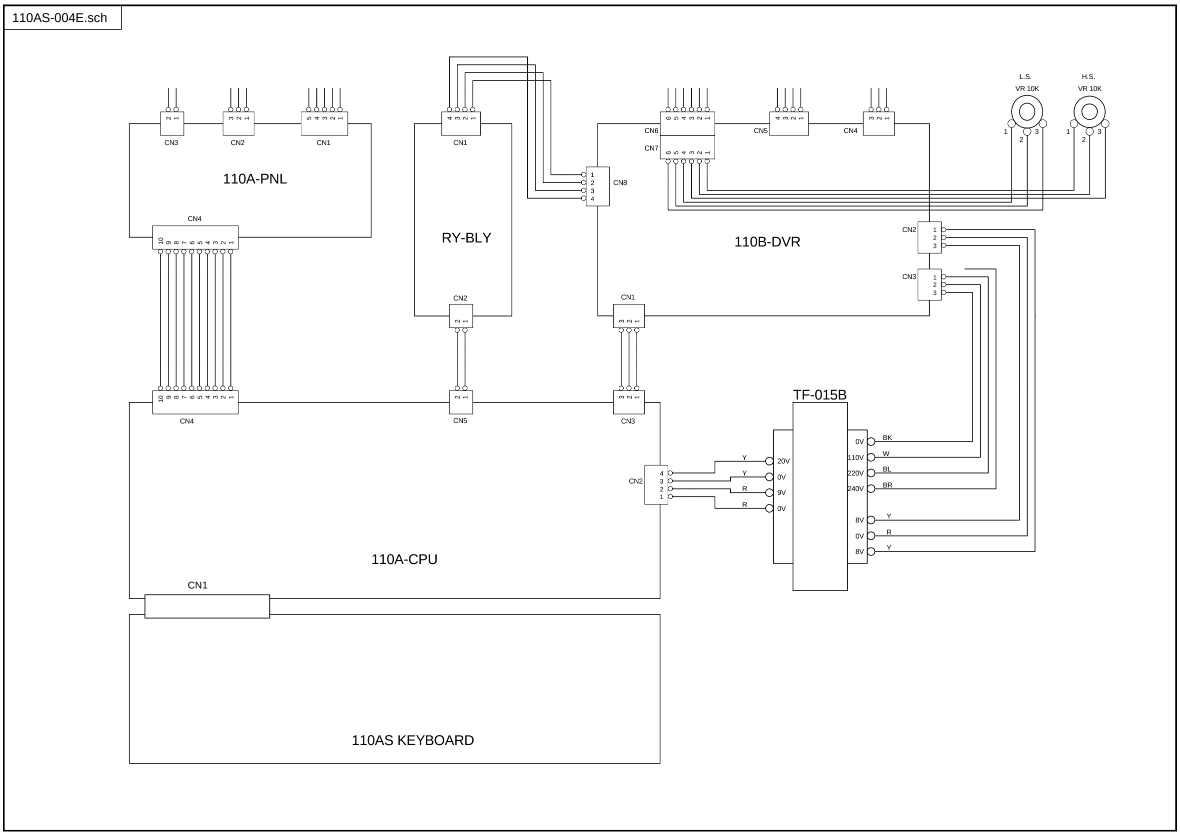


10.3.External wiring diagram for CNC-110AE

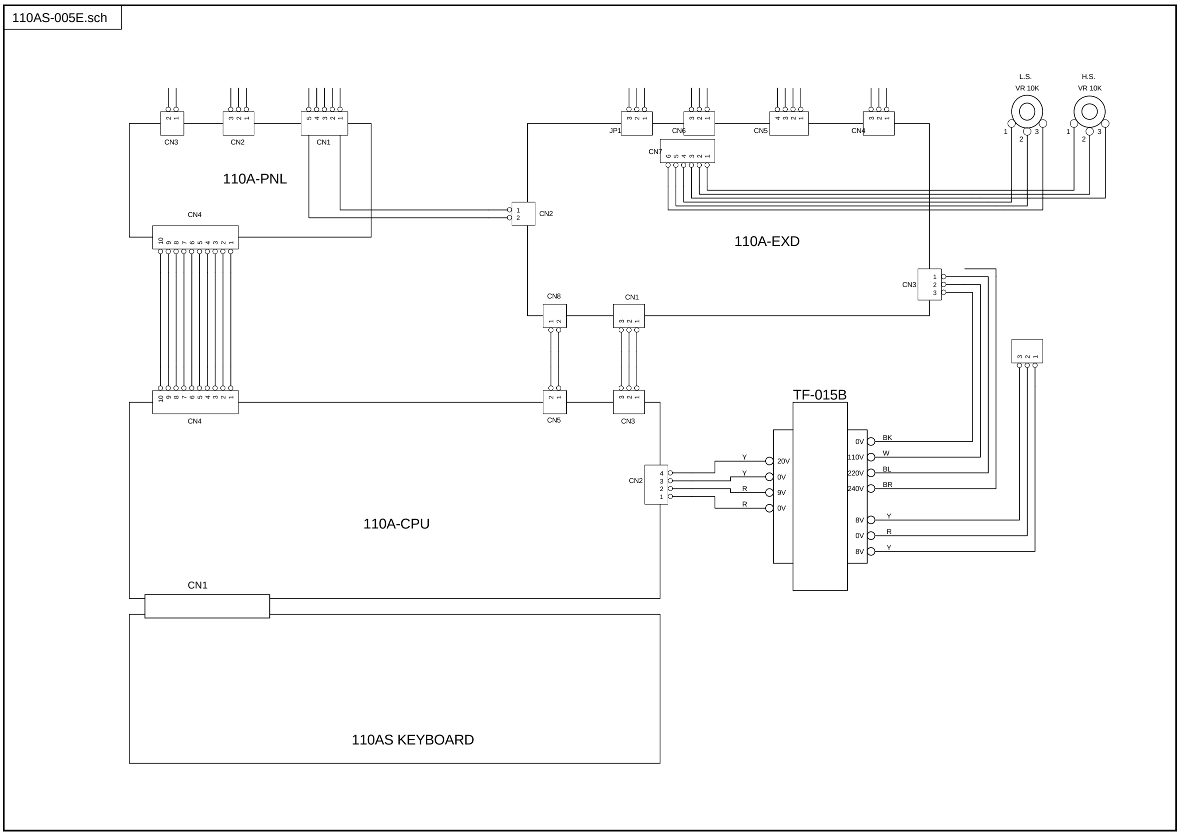


	CN5 PIN-2	CN5 PIN-3
JP1=2C	CW	CCW
JP1=1C	RUN	DIR

10.4.Internal wiring diagram for CNC-110AS



10.5.Internal wiring diagram for CNC-110AE



11. MAINTAIN AND TROUBLESHOOTING

11.1.Requirement and Safety precautions

1. The controller should be operated in an environment that is protected from moisture, corrosive gases, or liquid, and free from airborne dust, metallic particles, and magnetic noise.
2. Make sure that the power source supplies the correct voltage and is capable of supplying the required current to the controllers.
3. Do not connect or disconnect wires and connectors while power is applied to the controller.
4. Make sure the machine and controllers are properly grounded.
5. Make sure that the leads and connectors are connected correctly.
6. Normally operate under 5℃ ~ 50℃ environment, over 40℃ should perform under good ventilation, avoid heating.

11.2.Periodically maintain

The following parts must be maintained or changed periodically as list below. If any part is found faulty, it must be changed immediately even when it has not yet reached the end of its life, which depends on the operating method and environmental condition. For parts replacement, please contact your sales representative.

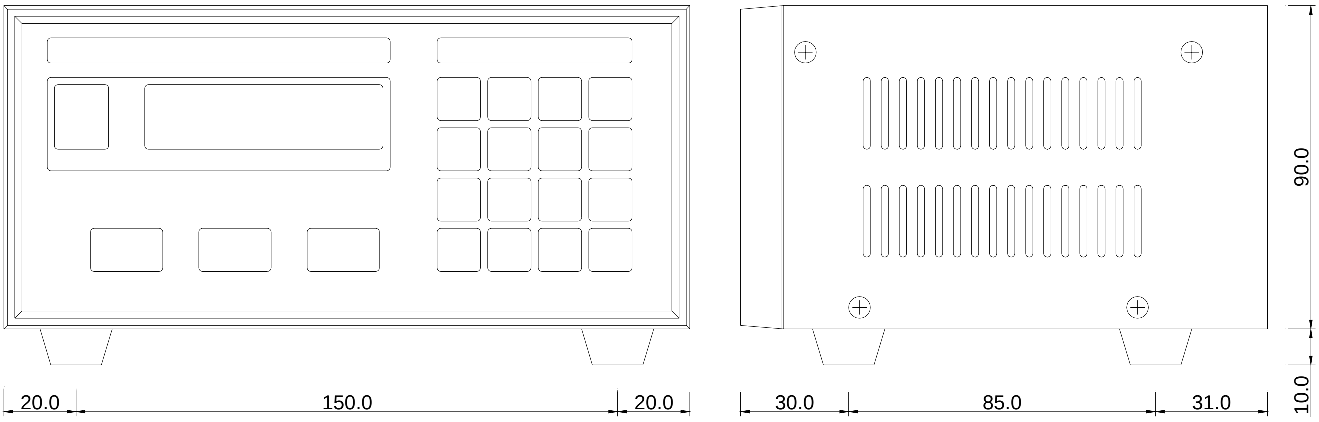
NO	Part name	Life guideline
1	Winding spindles Turns counter **CNTB-03B/03C**	2 years
2	**RELAY** (**RY-BLY** board, it used to switching the winding direction)	100,000 times
3	Carbon **BRUSH** in the DC motor	1 years

11.3.Troubleshooting

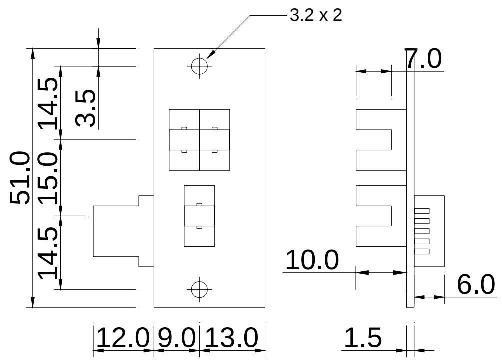
This section provides information to guide the user in understanding different fault condition and their general troubleshooting procedures, and with their possible solutions.

NO	Fault Description	Correctives Action
1	Power ON, but the display shows nothing,	**a.** Check AC power input. **b.** Check the fuse on 110B-DVR board. **c.** Check the wire connection between 110B-DVR, TF-015B and 110A-CPU. **d.** Replace 110A-CPU. **e.** Replace transformer TF-015B.
2	Display shows confusion massage.	**a.** Replace 110A-CPU.
3	Fuse failure	**a.** Replace fuse. **b.** Replace 110B-DVR. **c.** Replace transformer TF-015B.
4	Cannot edit parameters.	**a.** Replace 110AS-KEY BOARD. **b.** Replace 110A-CPU.
5	Winding spindles motor cannot work.	**a.** Check speed adjust potentiometer on back panel. **b.** Check the wire connection between motor and controller. **c.** Replace 110B-DVR/110A-EXD. **d.** Replace 110A-CPU. **e.** Replace motor.
6	Can not switching the winding direction.	**a.** Check the wire connection between 110A-CPU and RY-BLY. **b.** Replace RY-BLY or replace 110A-EXD. **c.** Replace 110A-CPU.
7	Counting failure.	**a.** Check the wire connection between 110A-CPU and 110A-PNL. **b.** Replace CNTB-03B/03C. **c.** Replace 110A-CPU.
8	Brake failure.	**a.** Check the wire connection between 110A-CPU and 110A-PNL. **b.** Replace 110A-CPU. **c.** Replace BRAKE.

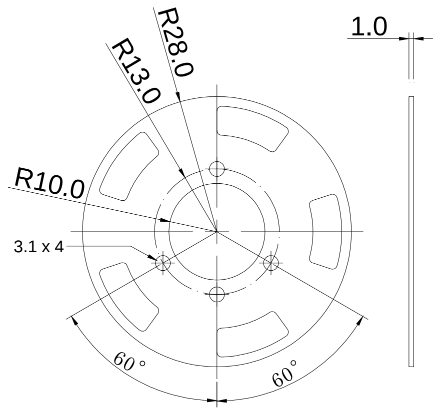
12. DIMENSIONS



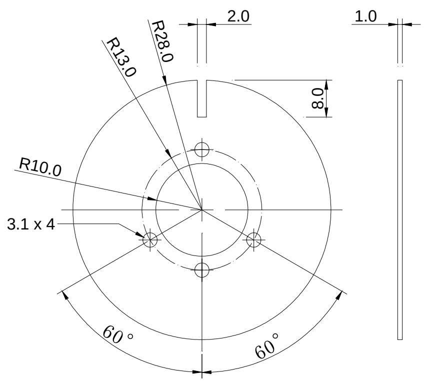
CNC-110AS/CNC-110AE



Counting Sensor
CNTB-03B



Counting Disc



Zeroing Disc